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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/704,641	11/01/2000	Maximilian Albert Biberger	SSI-00700	4503

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HAVERSTOCK & OWENS LLP
162 NORTH WOLFE ROAD
SUNNYVALE, CA 94086

EXAMINER

KACKAR, RAM N

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 11/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/704,641

Applicant(s)

BIBERGER ET AL.

Examiner

Ram N Kackar

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 September 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25, 29-31 and 33-40 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-25, 29-31 and 33-40 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Priority

1. Applicant's claim for domestic priority under 35 U.S.C. 119(e) is acknowledged. However, the provisional application upon which priority is claimed fails to provide adequate support under 35 U.S.C. 112 for claim 1-25, 31, 33 and 40 of this application. The newly added limitation of "the supercritical processing module configured to withstand pressures above 1500 psi" is not supported by the provisional application. The mention of at least 1000 psi is not considered an adequate support since the critical pressure of CO₂ is about 1000 psi and any vessel containing supercritical CO₂ would have to withstand at least that much pressure.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 6-8, 15-17, 19-20, 25, 29-31, 33, 39 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Edward Bok et al (Article Super critical Fluids for Single wafer Cleaning, Solid State Technology, June 1992) in view of Yasuda Toru (JP 2000-106358).

Bok teaches a cluster tool configuration with a supercritical fluid cleaning module using carbon dioxide (Fig 4, 5 and Page 117 Col 3 and Page 120 lines 12-19), which is designed for high pressure (Page 118 Col 2), a transfer module with a robot coupled to it (Page 118 Col 3 last Para) and a non-supercritical module for etching (Page 119 Col 2 and Page 120 lines 12-19) and lower input valve for inlet and lateral valve for exit of fluid (Page 118 Col 3).

A non-supercritical module being attached to the transfer module is inherent in view of Bok teaching that chemical etching is usually followed by cleaning (Page 119 Col 2) and that the supercritical module would typically be used after HF (etching) process and would be ideally done in a cluster tool where substrate could be contaminant free between multiple process steps (Page 120 lines 12-19).

Bok does not disclose the supercritical module to be able to withstand more than 1500 psi and a circulation line to circulate super critical fluid in the processing cavity.

Yasuda Toru discloses a module capable of doing supercritical processing (Abstract), comprising a pressure vessel (Fig 1-100a), a work piece cavity (100a) for holding a work piece during processing, ingress and egress for the work piece (106), a pressurizing means for the supercritical processing module (111) and sealing means (110) for the entrance of the supercritical processing module, operating pressures of 20 Mpa (Paragraph 0048) and recirculation line (121).

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to use a recirculation device for faster cleaning with advantage of cost and environmental friendliness and have higher pressure capability to get the advantage of supercritical processing at a higher pressure.

Regarding claim 40 inclusion of material or article worked upon by a structure being claimed does not impart patentability to the claims. In re Young, 75 F.2d 966, 25 USPQ 69 (CCPA 1935) (as restated in In re Otto, 312 F.2d 937, 136 USPQ 458, 459 (CCPA 1963)). Also where the only difference between the prior art and the claims is a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions

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would not perform differently than the prior art device, the claimed device is not patentably distinct from the prior art device. In Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984).

The limitation that during circulation the super critical fluid remains in a supercritical state is an intended use limitation since the recirculation line could be used for simple recirculation.

4. Claims 1, 6-8, 15-17, 19- 20, 25, 29-31, 33, 39 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Edward Bok et al (Article Super critical Fluids for Single wafer Cleaning, Solid State Technology, June 1992) in view of Fujikawa (US 59 79306) and Shigeru Ueno (JP 08206485).

Bok teaches a cluster tool configuration with a supercritical fluid cleaning module using carbon dioxide (Fig 4, 5 and Page 117 Col 3 and Page 120 lines 12-19), which is designed for high pressure (Page 118 Col 2), a transfer module with a robot coupled to it (Page 118 Col 3 last Para) and a non- supercritical module for etching (Page 119 Col 2 and Page 120 lines 12-19) and lower input valve for inlet and lateral valve for exit of fluid (Page 118 Col 3).

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Bok does not disclose the supercritical module to be able to withstand more than 1500 psi.

Fujikawa et al disclose a module capable of doing supercritical processing (Col 1 line 9-14), comprising a pressure vessel (Col 3 line 21), a work piece cavity (Fig 4-5) for holding a work piece during processing, ingress and egress for the work piece (Fig 2-14), placement of the work piece in the work piece cavity through the transfer mechanism (Col 7 line 25-29), a pressurizing means for the supercritical processing module (Fig 4-26 and Col 8 line 12-25) and sealing means (Fig 1B-9 and Col 5 line 44) for the entrance of the supercritical processing module. Fujikawa further discloses the possibility of using pressure in excess of 1000kgf/cm² (Col 3 lines 54-55 and Col 6 lines 60-61)

Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to use a supercritical process module taught by Fujikawa to a cluster tool of Bok to get the advantage of supercritical processing at a higher pressure.

Bok as modified by Fujikawa however does not disclose a circulation line to circulate super critical fluid in the processing cavity.

Since circulation of supercritical fluid over work piece offers the advantages of continuous rinsing action on the substrate and reuse helps reduce cost and helps the environment, an alternative cleaning method has been proposed by several inventors.

Shigeru Ueno discloses recirculation passage (Abstract and Fig 1-7).

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to use a recirculation device for faster cleaning with advantage of cost and environmental friendliness.

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5. Claims 2-5, 9-10 and 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Edward Bok et al (Article Super critical Fluids for Single wafer Cleaning, Solid State Technology, June 1992) in view of Fujikawa (US 59 79306) and Shigeru Ueno (JP 08206485) as applied to claims 1, 6-8, 15-17, 19- 20, 25, 29-31, 33, 39 and 40 and further in view of Chen et al (US Patent 6110232).

Edward Bok et al in view of Fujikawa and Shigeru Ueno is discussed above.

Bok as modified by Fujikawa and Shigeru Ueno does not disclose the usual, necessary and obvious details of the transfer related apparatus for its cluster tool.

Chen et al disclose a multi chamber cluster tool and as part of that disclose a transfer module (Fig1-20) having an entrance (attached to load locks 12 and 14), a process module coupled to the transfer module (Fig3-32), a transfer mechanism coupled to the transfer module which is configured to move the work piece between the entrance, and any other processing module coupled to it (Fig 3-28), means for injecting inert gas like nitrogen to allow the pressure in the transfer chamber to be slightly positive (Col 2 line 22-25), two hand off stations (Fig 3-14 and 12) adapted in two load locks at the entrance of the transfer module, non supercritical module to be a semiconductor module of the type of an etch, PVD or CVD (Col 1 line 14-21), the transfer mechanism to be a central robot (Fig 3-28) adapted in a circular configuration, the robot arm to comprise an extendable arm and an end effector (Fig 3-28) and the transfer module to be vacuum capable (Fig 1-20).

Therefore it would have been obvious to one having ordinary skill in the art at the time invention was made to integrate to Bok's cluster tool the transfer module and accessories in order to make Bok's cluster tool realize the advantage of supercritical processing step with other

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processing on a wafer without taking the wafer out of clean environment between steps and to have higher throughput.

6 Claims 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Edward Bok et al (Article Super critical Fluids for Single wafer Cleaning, Solid State Technology, June 1992) in view of Fujikawa (US 59 79306) and Shigeru Ueno (JP 08206485) as applied to claims 1, 6-8, 15-17, 19- 20, 25, 29-31, 33, 39 and 40 and further in view of White et al (US Patent 6235634).

Edward Bok et al in view of Fujikawa and Shigeru Ueno is discussed above.

Bok as modified by Fujikawa and Shigeru Ueno disclose a robot as transfer mechanism but does not disclose the transfer mechanism to comprise a track configuration. White et al disclose a robot on a track configuration (Fig 2 and Col 6 lines 30-59).

As track configuration allows for unrestricted placement of processing modules along the track, it would have been obvious to one having ordinary skill in the art at the time invention was made to have a track configured robot of White as a transfer mechanism for Bok.

7 Claims 13-14, 18 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Edward Bok et al (Article Super critical Fluids for Single wafer Cleaning, Solid State Technology, June 1992) in view of Fujikawa (US 59 79306) and Shigeru Ueno (JP 08206485) as applied to claims 1, 6-8, 15-17, 19- 20, 25, 29-31, 33, 39 and 40 and further in view of Adachi et al (US Patent 6077321).

Edward Bok et al in view of Fujikawa and Shigeru Ueno is discussed above.

Bok as modified by Fujikawa and Shigeru Ueno does not disclose a robot with extendable dual arm and end effector and an antechamber coupled to a transfer module and a supercritical processing module.

Adachi et al discloses a cluster tool with extendable arm and dual arm with dual end effectors (Fig 1) designed for substrate processing with cleaning and drying and disclose a small volume antechamber (buffer chamber) between transfer module and a cleaning /drying chamber in order to isolate the environment of film forming module from cleaning /drying module (Fig 1). Adachi et al go a great length in explaining how the use of antechamber allows atmospheres to be controlled in each module to maintain environments for optimum processing (Col 5 -11).

With this teaching on hand, it would have been obvious to one having ordinary skill in the art to have an antechamber like that of Adachi et al to install in front of supercritical module of Bok so as to provide isolation between high pressure module of supercritical processing and low pressure transfer module or any other module configured for a different processing, attached to it.

8 Claims 34- 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Edward Bok et al (Article Super critical Fluids for Single wafer Cleaning, Solid State Technology, June 1992) in view of Fujikawa (US 59 79306) and Shigeru Ueno (JP 08206485) as applied to claims 1, 6-8, 15-17, 19- 20, 25, 29-31, 33, 39 and 40 and further in view of Racette et al (US Patent 6355072).

Edward Bok et al in view of Fujikawa and Shigeru Ueno is discussed above.

Bok as modified by Fujikawa and Shigeru Ueno does not disclose additional solvent line connected to the workpiece cavity through connection to circulating line.

Racette et al disclose a vessel for supercritical processing (Col 4 lines 19-34) where the supercritical fluid undergoes cycling in addition to solvent (Fig 2 and Col 13 lines 3-18) connected through pumps (240, 242).

Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to have additional lines for solvent to enable faster cleaning using solvents in addition to supercritical fluid.

9 Claims 2-5, 9-10 and 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Edward Bok et al (Article Super critical Fluids for Single wafer Cleaning, Solid State Technology, June 1992) in view of Yasuda Toru (JP 2000-106358) as applied to claims 1, 6-8, 15-17, 19- 20, 25, 29-31, 33, 39 and 40 and further in view of Chen et al (US Patent 6110232).

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Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to have additional lines for solvent to enable faster cleaning using solvents in addition to supercritical fluid.

Response to Amendment

Applicant's arguments filed 9/20/2004 have been fully considered but they are not persuasive.

Applicant adds a limitation that the supercritical processing module is configured to withstand pressures above 1500 psi and states that Bok could not be used for pressure above 1500 psi and Bok cannot be modified to contain a circulation loop.

Even though Examiner cannot acquiesce to applicant's arguments in regard to Bok, this point has become moot in view of modified grounds of rejection.

Applicant argues against Ueno not disclosed coupled to a cluster tool.

Since Ueno is used in combination with other reference and not alone this argument is not persuasive.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ram N Kackar whose telephone number is 571 272 1436. The examiner can normally be reached on M-F 8:00 A.M to 5:P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on 571 272 1439. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

RK

P. Hassanzaad
primary Examiner
AU 1763

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